



**Portage Creek Superfund Site  
Kalamazoo, Michigan**

**Summary and Analysis of PCB Surface-Weighted Average Concentration  
from 0-6 Inches**

Prepared by:

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## Background Information

Between 1993-1997 and 2008-2010, sediment sampling was conducted throughout Portage Creek in order to analyze PCB concentrations. During these sampling events, samples were collected at different depths to assess areas with high levels of PCB contamination.

## Deriving Grid Removal Areas for PCB Surface-Weighted Averages

To calculate the surface-weighted average concentration of PCB in Portage Creek, each remediation area was subdivided into excavation areas with a surface area of approximately 2250 ft<sup>2</sup>. The most downstream portion of each excavation area contained the remainder of the surface area as each excavation area could not be perfectly divided into an area with exactly 2250 ft<sup>2</sup>. Afterwards, an Inverse Distance Weighting interpolation of the data from 0-6 inches was performed across Portage Creek and then clipped to each excavation area. Each excavation area was assigned the mean PCB concentration value from each interpolation grid. By having these boundaries assigned with unique values, surface-weighted averages could then be calculated to estimate the pre-remediation PCB concentration. Table 1 shows the surface-weighted average of PCB from a depth of 0-6 inches across all of Portage Creek, as well as for the proposed remediation areas and areas not to be remediated. The surface-weighted averages were calculated using the following equation:

$$\frac{(\text{Result A} \times \text{Surface Area A}) + (\text{Result B} \times \text{Surface Area B}) + \dots + (\text{Result Z} \times \text{Surface Area Z})}{(\text{Surface Area A} + \text{Surface Area B} + \dots + \text{Surface Area Z})}$$

## Summary of PCB Surface-Weighted Average Concentration Results

For the remediation areas, the pre-remediation PCB surface-weighted average is 17.3 mg/kg, while the surface-weighted average for just the non-remediated areas is 4.7 mg/kg (see Table 1). The pre-remediation PCB surface-weighted average concentration in Portage Creek is 10.37 mg/kg. The expected post-removal concentration for all of Portage Creek is 2.73 mg/kg (see Table 2).

Looking at Table 1, SA5-C has the highest surface-weighted average for PCB with 40.91 mg/kg, followed by Axtell Creek with 38.36 mg/kg. Remediation areas SA1-C and SA7 had surface-weighted average concentrations of 33.83 and 31.28 mg/kg, respectively. SA3-A had the lowest surface-weighted average concentration, 3.58 mg/kg, for all remediation areas.

For the non-remediated areas, Table 1 shows the surface-weighted average concentration for PCBs ranged from as low as 1.49 mg/kg across SA4 to as high as 59.43 mg/kg across SA5-D (see Figure 1). As with remediation area SA5-C, the actual surface-weighted average concentration may not represent the true PCB concentration at the surface due to having few

sample points when interpolating at this depth interval. The only other non-remediation area that had a surface-weighted average greater than 10 mg/kg was SA6 with 17.16 mg/kg of PCB.

## **Caveat**

One note of consideration is that the current Portage Creek boundaries remediation area boundaries are floodplain boundaries estimates. Additionally, the mass estimates from SA5-A and SA5-C were generated from very few sample locations within these remediation areas (five for SA5-A and two for SA5-C). With more sampling, PCB surface-weighted average concentration estimates may increase or decrease within the remediation areas.

## **Contact**

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<b>Remediation Areas</b>	<b>Area (ft²)</b>	<b>PCB Surface-Weighted Average Concentration (mg/kg) from 0-6 inches</b>
SA1-A	19,812	30.17
<i>SA1-B High</i>	<i>1,315</i>	23.58
SA1-C	7,961	33.83
SA3-A	17,991	3.58
SA5-A	14,078	10.33
SA5-C*	14,210	40.91
SA5-D	36,625	5.21
SA6	31,427	7.20
SA7	11,153	31.28
Axtell Creek	10,335	38.36
<b>Total: Remediated Areas</b>	<b>164,907</b>	<b>17.30</b>
<b>Non-Remediated Areas</b>	<b>Area (ft²)</b>	<b>PCB Surface-Weighted Average Concentration (mg/kg) from 0-6 inches</b>
SA1-A	14,603	4.00
SA1-B	7,819	5.92
SA1-C	24,727	6.43
SA3-A	3,910	3.65
SA3-B	13,539	2.37
SA4	48,520	1.49
SA5-A	2,164	7.16
SA5-B	11,014	2.7
SA5-C	2,619	2.1
SA5-D*	3,480	59.43
SA6	1,610	17.16
SA7	67,116	4.15
<b>Total: Non-Remediated Areas</b>	<b>201,121</b>	<b>4.70</b>
<b>Total: Portage Creek</b>	<b>366,028</b>	<b>10.37</b>

Table 1: Pre-Remediation PCB Surface-weighted Average Concentrations across Portage Creek  
Remediation and Non-remediation Areas

\* The PCB surface weighted averages for Remediation Area SA5-C and Non-Remediated Area SA5-D may not be representative of the actual PCB concentration at the surface due to a dearth of sample points used for interpolation.  
*Area within SA1-B that is going to be excavated*

NOTE: Areas' boundaries will be redefined during reconnaissance and removal work; hence, SWACs, Volumes, and Mass values presented here will likely be adjusted.

<b>Remediation Areas</b>	<b>Area (ft²)</b>	<b>PCB Post-Remediation Concentration (mg/kg) from 0-6 inches</b>
SA1-A	19,812	0.33
<i>SA1-B High</i>	<i>1,315</i>	<i>0.33</i>
SA1-C	7,961	0.33
SA3-A	17,991	0.33
SA5-A	14,078	0.33
SA5-C	14,210	0.33
SA5-D	36,625	0.33
SA6	31,427	0.33
SA7	11,153	0.33
Axtell Creek	10,335	0.33
<b>Non-Remediated Areas</b>	<b>Area (ft²)</b>	<b>PCB Post-Remediation Concentration (mg/kg) from 0-6 inches</b>
SA1-A	14,603	4.00
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SA5-B	11,014	2.7
SA5-C	2,619	2.1
SA5-D	3,480	59.43
SA6	1,610	17.16
SA7	67,116	4.15
<b>Total: Portage Creek</b>	<b>366,028</b>	<b>2.73</b>

Table 2: Post-Remediation PCB Surface-weighted Average Concentrations across Portage Creek

NOTE: Areas' boundaries will be redefined during reconnaissance and removal work; hence, SWACs, presented here will likely be adjusted.

# Portage Creek - Remediation Areas Reference

08/25/2011

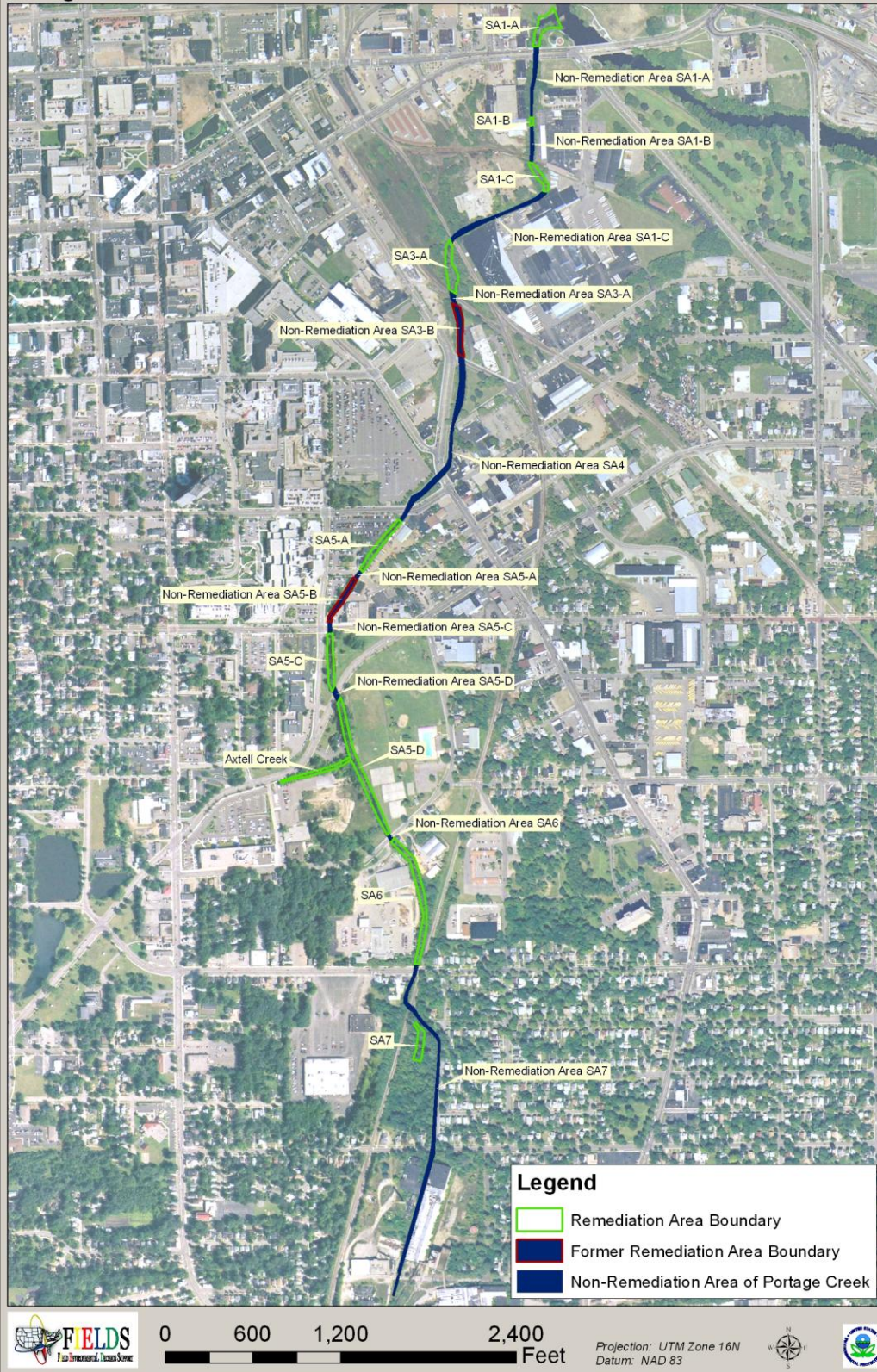


Figure 1: Remediation and Non-Remediation Area Boundaries within Portage Creek